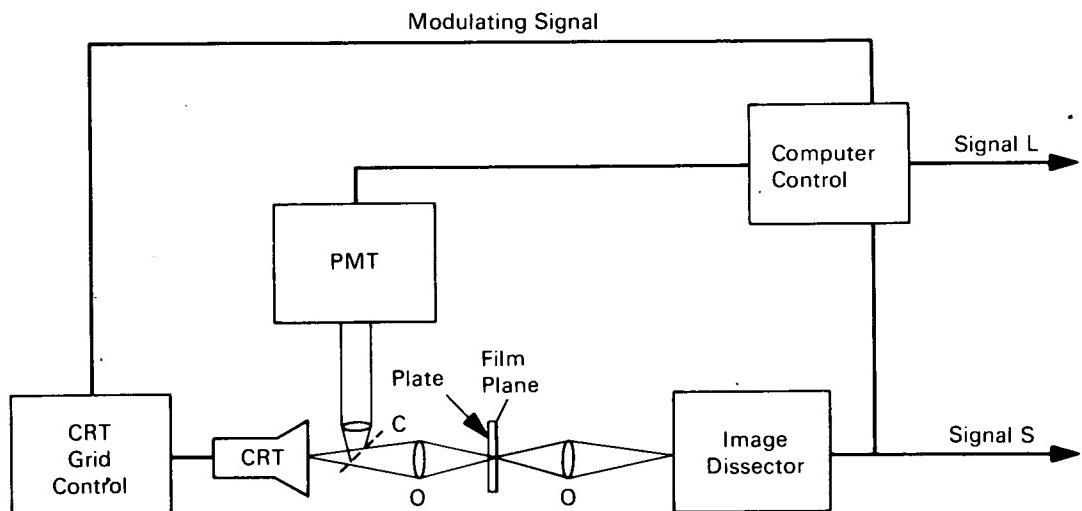


# NASA TECH BRIEF



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## Electrooptical Scanning of Film



An Implemental Configuration of the Scan-In /Scan-Out System

### The problem:

To devise a method of obtaining a tolerable signal-to-noise ratio from the camera of a flying-spot scanning system when there is a wide range of transmissivities within a given frame of film. In areas of low transmissivity more light is required in order to effect a camera-tube output of sufficiently high signal-to-noise ratio. Illumination of the whole frame with a light of higher intensity could cause a "flare" effect, especially from the areas of high transmissivity.

### The solution:

A novel concept of operation of a scan-in/scan-out flying-spot scanning system that recognizes three different levels of transmissivity within a frame; selectively it acts on these levels either to intensify the illumination or to extend the duration of the illuminating spot at any picture element. Thus it improves

the ratio of signal to tube noise in the camera's output.

### How it's done:

The increase in illumination at a picture element, necessary to raise the camera-tube output signal to a usable level, is effected by means of a closed-loop modulated-illumination system that senses the level of the tube's output signal. If the level is low, the system increases the intensity of spot illumination; if it is very low, the spot is caused to dwell on the picture element sufficiently long for the output to be integrated to a usable level. Confinement of the illumination to a spot decreases the system aperture and so greatly reduces the flare effect.

By separation of required illumination and by definition of the system apertures the technique provides for production and control of extreme brightness of

(continued overleaf)

light, but renders inconsequential phosphor decay, halo, astigmatism, scanning-spot size, etc. With use of a controlled brightness of light, a high signal-to-noise ratio can be achieved for each scanned element of the image.

The illuminator (scan-in component) is not limited to any particular source of light; sources may include cathode-ray tubes, incandescent lamps, arc lamps, and lasers. For scanning of an extended dynamic range, the scan-out component may be a nonstorage type of camera tube such as a scanned photomultiplier tube or an image-dissector tube. Storage types of camera tubes, such as vidicons, image orthicons, isoicons, or emitrons, may be used within their respective dynamic-range capabilities.

#### Notes:

1. This invention may interest those concerned with storage, or correction by computer, of photographic images.

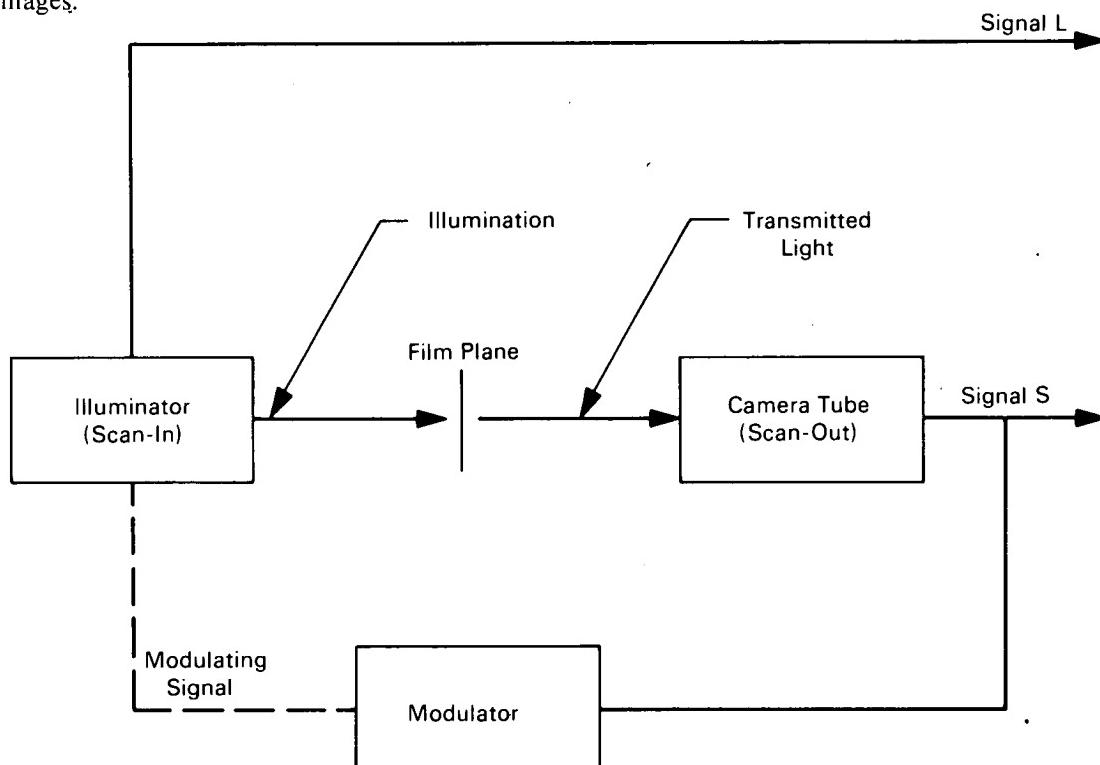
#### 2. Documentation is available from:

Clearinghouse for Federal Scientific  
and Technical Information  
Springfield, Virginia 22151  
Price \$3.00  
Reference: TSP69-10568

#### Patent status:

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Source: F.C. Billingsley and J. J. Volkoff of  
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Block Diagram of One Scan-In/Scan-Out Technique